

## CLAIMS

- 1           1.     A process of detecting an oligonucleotide elongation, the process  
2     comprising the steps of:  
3           (a)     providing an oligonucleotide;  
4           (b)     combining a detectable moiety and the oligonucleotide to form a  
5                    labeled oligonucleotide, the labeled oligonucleotide characterized  
6                    by an association independent of a dual contribution covalent bond  
7                    between the detectable moiety and the oligonucleotide;  
8           (c)     adding the labeled oligonucleotide to an oligonucleotide elongation  
9                    mixture;  
10          (d)     initiating an elongation reaction in the oligonucleotide elongation  
11                  mixture; and  
12          (e)     assaying for the labeled oligonucleotide in the oligonucleotide  
13                  elongation mixture to detect the oligonucleotide elongation.
- 1           2.     The process of claim 1 wherein the non-covalent association is  
2     selected from the group consisting of: an ionic bond, a hydrogen bond, a Van der  
3     Waals interaction and an organometallic coordinate covalent bond.
- 1           3.     The process of claim 1 wherein the detectable moiety comprises a  
2     fluorophore.
- 1           4.     The process of claim 1 wherein the detectable moiety comprises a  
2     metal-containing fluorescent compound.
- 1           5.     The process of claim 4 wherein the metal-containing fluorescent  
2     compound comprises platinum.
- 1           6.     The process of claim 4 wherein the metal-containing fluorescent  
2     compound comprises a metal selected from the group consisting of: palladium,  
3     rhodium, ruthenium, osmium, and iridium.

1           7.     The process of claim 1 wherein the elongation reaction is a  
2     polymerase chain reaction.

1           8.     The process of claim 1 wherein the elongation reaction is a reverse  
2     transcription reaction.

1           9.     The process of claim 1 wherein the elongation reaction is a primer  
2     extension reaction.

1           10.    The process of claim 1 wherein the elongation reaction is a ligase  
2     chain reaction.

1           11.    The process of claim 1 wherein the process further comprises the  
2     step of purifying the labeled oligonucleotide.

1           12.    The process of claim 1 wherein the step of assaying the labeled  
2     oligonucleotide comprises a measurement of fluorescence polarization.

1           13.    The process of claim 1 wherein the step of assaying the labeled  
2     oligonucleotide comprises a measurement of fluorescence intensity.

1           14.    The process of claim 1 wherein the step of assaying the labeled  
2     oligonucleotide comprises a measurement of fluorescence resonance energy  
3     transfer.

1           15.    A process of detecting an oligonucleotide elongation, the process  
2     comprising the steps of:

3           (a)     providing an oligonucleotide elongation reaction mixture  
4                    comprising an oligonucleotide labeled with a fluorescent  
5                    compound by an association independent of a dual contribution  
6                    covalent bond;

- 7 (b) measuring a fluorescence parameter in the oligonucleotide  
8 elongation reaction mixture at a first time point to obtain a test  
9 measurement; and  
10 (c) comparing the test measurement with a reference measurement to  
11 detect the oligonucleotide elongation.

1 16. The process of claim 15 wherein the reference is a second  
2 measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3 at a second time point.

1 17. The process of claim 16 wherein the second time point is before  
2 initiation of the elongation reaction.

1 18. The process of claim 16 wherein the first and second time points  
2 are after initiation of the elongation reaction.

1 19. The process of claim 15 wherein the reference is a measurement of  
2 a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1 20. The process of claim 15 wherein the non-covalent association is  
2 selected from the group consisting of: an ionic bond, a hydrogen bond, a Van der  
3 Waals interaction and an organometallic coordinate covalent bond.

1 21. The process of claim 15 wherein the fluorescent compound is a  
2 metal-containing fluorescent compound.

1 22. The process of claim 21 wherein the metal-containing fluorescent  
2 compound comprises platinum.

1 23. The process of claim 21 wherein the metal-containing fluorescent  
2 compound comprises a metal selected from the group consisting of: palladium,  
3 rhodium, ruthenium, osmium, and iridium.

1           24.    The process of claim 15 wherein the elongation reaction is a  
2   polymerase chain reaction.

1           25.    The process of claim 15 wherein the elongation reaction is a  
2   reverse transcription reaction.

1           26.    The process of claim 15 wherein the elongation reaction is a primer  
2   extension reaction.

1           27.    The process of claim 15 wherein the elongation reaction is a ligase  
2   chain reaction.

1           28.    The process of claim 15 wherein the fluorescence parameter is  
2   selected from the group consisting of: fluorescence polarization and fluorescence  
3   intensity and fluorescence resonance energy transfer.

1           29.    A process of detecting an oligonucleotide elongation, the process  
2   comprising the steps of:

- 3           (a)    providing an oligonucleotide elongation reaction mixture  
4                   comprising an oligonucleotide labeled with a metal-containing  
5                   fluorescent compound;  
6           (b)    measuring a fluorescence parameter associated with the metal-  
7                   containing fluorescent compound in the oligonucleotide elongation  
8                   reaction mixture at a first time point to obtain a test measurement;  
9                   and  
10          (c)    comparing the test measurement with a reference measurement to  
11                   detect the oligonucleotide elongation.

1           30.    The process of claim 29 wherein the metal-containing fluorescent  
2   compound comprises platinum.

1           31.    The process of claim 29 wherein the metal-containing fluorescent  
2   forms a coordinate covalent bond to label the oligonucleotide.

1           32.    The process of claim 29 wherein the metal-containing fluorescent  
2   compound comprises a metal selected from the group consisting of: palladium,  
3   rhodium, ruthenium, osmium, and iridium.

1           33.    The process of claim 29 wherein the elongation reaction mixture is  
2   a polymerase chain reaction mixture.

1           34.    The process of claim 29 wherein the fluorescence parameter is  
2   selected from the group consisting of: fluorescence polarization, fluorescence  
3   intensity and fluorescence resonance energy transfer.

1           35.    The process of claim 29 wherein the reference is a second  
2   measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3   at a second time point.

1           36.    The process of claim 35 wherein the second time point is before  
2   initiation of the elongation reaction.

1           37.    The process of claim 35 wherein the first and second time points  
2   are after initiation of the elongation reaction.

1           38.    The process of claim 29 wherein the reference is a measurement of  
2   a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1           39.    A process of detecting formation of an oligonucleotide hybrid, the  
2   process comprising the steps of:

3           (a)    providing a hybridization reaction mixture comprising an  
4                  oligonucleotide labeled with a metal-containing fluorescent  
5                  compound;

- 6           (b)     measuring a fluorescence parameter associated with the metal-  
7                   containing fluorescent compound in the hybridization reaction  
8                   mixture at a first time point to obtain a test measurement; and  
9           (c)     comparing the test measurement with a reference measurement to  
10                   detect the oligonucleotide hybridization.

1           40.     The process of claim 39 wherein the metal-containing fluorescent  
2                   compound comprises platinum.

1           41.     The process of claim 39 wherein the metal-containing fluorescent  
2                   forms a coordinate covalent bond to label the oligonucleotide.

1           42.     The process of claim 39 wherein the metal-containing fluorescent  
2                   compound comprises a metal selected from the group consisting of: palladium,  
3                   rhodium, ruthenium, osmium, and iridium.

1           43.     The process of claim 39 wherein the reference is a second  
2                   measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3                   at a second time point.

1           44.     The process of claim 43 wherein the second time point is before  
2                   initiation of the elongation reaction.

1           45.     The process of claim 43 wherein the first and second time points  
2                   are after initiation of the elongation reaction.

1           46.     The process of claim 39 wherein the reference is a measurement of  
2                   a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1           47.     The process of claim 35 wherein the fluorescence parameter is  
2                   selected from the group consisting of: fluorescence polarization, fluorescence  
3                   intensity and fluorescence resonance energy transfer.

1           48.    A process for detection of changes in a nucleic acid essentially as  
2 described herein in any of the examples.

1           49.    A process for nucleic acid quantification essentially as described  
2 herein in any of the examples.

1           50.    A commercial package comprising a metal-containing fluorescent  
2 compound reaction mixture component along with instructions for use thereof to  
3 detect changes in an oligonucleotide indicative of elongation or hybridization.

1           51.    The use of a detectable moiety attached post-synthesis to an  
2 oligonucleotide for real-time detection of changes in nucleic acid elongation,  
3 amplification or hybridization.

1           52.    The use of claim 51 wherein the detectable moiety is a fluorophore.

1           53.    The use of claim 52 wherein the fluorophore is a metal-containing  
2 fluorescent compound.

1           54.    The use of claim 53 wherein the metal-containing fluorescent  
2 compound contains platinum.